REMARKS

Reconsideration and allowance are respectfully requested. Claims 4 and 7 have been amended. Claims 8 and 9 are new. Thus, claims 1-9 are pending.

The Specification has been amended to include headings. Also, the correct French patent number is now listed on page 1.

The Abstract has been amended to address the Examiner's objection.

A drawing Replacement Sheet accompanies this amendment. Item 14e has been removed from FIG. 2.

Claims 4 and 7 stand objected to under 37 CFR 1.759(c) as being in improper form. Claim 4 has been placed in independent format and claim 7 has been amended to depend from claim 4 or 5 in order to overcome the objection.

New claims 8 and 9 have been added to depend from independent claim 4 and include the subject matter of claims 2 and 3, which depend from claim 1.

Claims 1-3, 5 and 6 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Underwood et al. in view of Kersey. This rejection is respectfully traversed.

Underwood et al. relates to a method and an apparatus for detection of cracks and strains on structures using optical fibres and Bragg gratings. More precisely, according to the text of the abstract and specification, Underwood et al. teaches the use of optical fibres 2 drowned in a ribbon cable 12 adhesively bonded on the structure. In the embodiment shown in Fig. 3 of Underwood et al. (see also column 3, line 22 to column 4, line 5 and claim 1), the position of a discontinuity along an optical fibre is located by reflection of the light at the two ends of the optical fibre, and the measurement of deformation on certain optical fibres uses Bragg gratings 37 (Fig. 5). These two measurements (location of a discontinuity and measurement of deformation) are made by _different_ techniques.

Moreover, Underwood et al. does not specifically relate to the monitoring of a work of civil engineering and that Underwood et al. does not mention the use of geosynthetic as support of optical fibres. It is well settled that each and every claim limitation must be taught or suggested. As specified in MPEP §2143.03, entitled "**All**

Claim Limitations Must Be Taught or Suggested": "To establish prima facie obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). 'All words in a claim must be considered in judging the patentability of that claim against the prior art.' *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970)." MPEP §2143.03 at 2100-131 (Rev. 5, Aug. 2006).

Kersey relates to seismic monitoring using an "optical seismic sensor reconfigurable array". This array 14 comprises (see figure 2 and columns 3-4) an optical fibre F1 provided with *optical seismic sensors* that comprise at least one sensor coil 40, 42, 44, 46, 48, 50, 52, 54 disposed between the gratings of a *Fiber Bragg Grating partial reflector pair* 22, 24, 26, 28, 30, 32, 34, 36, 38 having a selectable given wavelength.

A first group of *optical seismic sensors* having a length D is composed of the two *Fiber Bragg Grating partial reflector pairs* 22, 30; 30, 38 having the wavelength $\lambda1$ and two groups of four multiple *sensor coils* 40, 42, 44, 46; 48, 50, 52 54; with each group being disposed between the two *Fiber Grating partial reflectors* of the first and the second pairs.

A second group of *optical seismic sensors* is composed of the eight pairs (of length L) of *Fiber Bragg Grating partial reflectors* 22, 24; 24, 26; 26, 28; 28, 30; 30, 32; 32, 34; 34, 36; 36, 38 having the wavelength $\lambda2$ and of eight multiple *sensor coils* 40, 42, 44, 46, 48, 50, 52, 54, with each sensor coil being disposed between the two *Fiber Bragg Grating partial reflectors* of one among the eight pairs of reflectors.

In this configuration, the *Fiber Bragg Grating partial reflectors* 22, 30 and 38 are at the same time adjusted over the wavelength $\lambda1$ and with the wavelength $\lambda2$ (adjustment over double wavelength $\lambda1$ and $\lambda2$).

As shown in FIG. 2 of Kersey, an element of length D of the first group of optical seismic sensors entirely covers an element of length L of the second group of optical seismic sensors. This underlining (see column 4, lines 18 to 28) arises as an essential parameter to allow collection of information on the seismic forces in various arrays 14 according to configurations variable on several levels.

As indicated column 3, lines 40 to 43, the pairs of *Fiber Bragg Grating partial*

reflectors include either Bragg gratings, or multiple Bragg gratings or a laser formed element of pairs of multiple Bragg gratings. Thus, the pairs of *Fiber Bragg Grating partial reflectors* could correspond to a series of N1 consecutive Bragg gratings having the same wavelength. However, Kersey does not indicate explicitly that all the *Fiber Bragg Grating partial reflectors* 22, 24, 26, 28, 30, 32, 34, 35, 38 include the same N1 number of consecutive Bragg gratings.

In the "staggered" configuration of FIG. 3 of Kersey, an element of the first group of optical seismic sensors ('group "seen" at λ1') covers partially an element of the second group optical seismic sensors ('group "seen" at λ2'). The notion of <u>overlapping</u> is here again pointed out (see column 5, lines 14-16).

According to the embodiment shown in FIG. 4 of Kersey, *Fiber Bragg Grating partial reflectors* 202, 204, 210, 216 and 218 are at the same time adjusted over the wavelength λ1 and over the wavelength λ2 <u>(adjustment over double wavelength λ1 and L2)</u>.

According to the configuration of FIG, 5 of Kersey, the optical fibre F4 successively presents two *Fiber Bragg Grating partial reflectors* 302, 304 adjusted over the first wavelength λ1, then five *Fiber Bragg Grating partial reflectors* 306, 308, 310, 312 and 314 adjusted over the second wavelength λ2 and again two *Fiber Bragg Grating partial reflectors* 316, 318 adjusted over the first wavelength λ1.

However, Kersey does not indicate explicitly that this distribution can continue according to several iterations along the F4 fibre nor that the spacing between all the *Fiber Bragg Grating partial reflectors* 302, 304, 316, 318 of the first type (λ1) and the *Fiber Bragg Grating partial reflectors* 306, 308, 310, 312 and 314 of the second type (λ2) is constant (which is not the case in FIG. 4).

Lastly, according to the embodiment shown in FIG. 6 of Kersey, *Fiber Bragg Grating partial reflectors* adjusted over four wavelengths λ1, λ2, λ3, λ4 which are disposed in a completely <u>superimposed</u> manner (in "pyramid") between them.

The Examiner considers that a person of ordinary skill in the art would apply the teaching of the Kersey (Figures 2 to 5) to a technique of structure monitoring in conformity with the teaching of Underwood et al., to arrive at the claimed invention. Applicants disagree for the following reasons:

A) In the embodiment of FIG. 5 of Kersey, and in the other embodiments of FIGS. 2 to 4 and 6 of Kersey, the following claimed features of the invention are not disclosed nor suggested:

- Bragg gratings <u>regularly</u> spaced,

- several series of <u>N1</u> Bragg gratings <u>consecutive</u> that correspond to the same wavelength (as an example of the invention: when N1= four, this features could mean for instance two series of four = four times $\lambda 1$ then four times $\lambda 2$, without superposition/overlapping),

- the aforementioned series being themselves divided into <u>identical</u> sets of N2 <u>consecutive</u> series corresponding to different wavelengths (as an example of the invention: when N2= five, this features could mean for instance having identical sets of five series = (four times $\lambda 1$ then four times $\lambda 2$) then (four times $\lambda 1$ then four times $\lambda 2$) (four times $\lambda 1$ then four times $\lambda 2$) then (four times $\lambda 1$ then four times $\lambda 2$) then (four times $\lambda 1$ then four times $\lambda 2$),

- use of at least <u>two</u> optical fibres organized as indicated previously.

B) In the embodiments of FIGS. 2 to 4 and 6 of Kersey, the following features can be found:

- partial or total superposition between an element of the first group of optical seismic sensors and an element of the second group of optical seismic sensors

and/or

- presence of *Fiber Bragg Grating partial reflectors* which are adjusted over a double wavelength $\lambda 1$ and $\lambda 2$.

Applicant submits that these features would be found in the combination of the teachings of Kersey and Underwood et al. and which is not the configuration as claimed.

C) In the embodiment of FIG. 5 of Kersey, there are no explicitly Bragg gratings <u>regularly</u> spaced (in FIG. 5, the spacing between 302, 304, 306, 308, 310, 312, 314, 316 and 318 is not constant), one does not find N1 times $\lambda 1$ then N1 times $\lambda 2$ but twice

λ1 then five times λ2, and one does not find N2 times (N1 times λ1 then N1 times λ2).

D) Kersey uses in all cases a *sensor coil,* whereas it is not the case in the claimed invention. Applicants submit that a sensor coil would be employed in the combination of the teaching of Kersey and Underwood et al. and is not the configuration claimed.

E) Kersey or Underwood et al. do not teach or suggest that the optical fibres equip a geosynthetic fabric, nor that their techniques are used to monitor the deformations of a work of civil engineering as claimed.

For these reasons, the rejection of independent claims 1 and 4, and the claims that depend therefrom, is improper and should be withdrawn.

All objections and rejections having been addressed, it is respectfully submitted that this application is in condition for allowance and a Notice to that effect is earnestly solicited.

Respectfully submitted,

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